TIME DIARY MEASURES OF INVESTMENT IN YOUNG CHILDREN

by

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Abstract

There is a rising importance of human capital in the total capital stock of an economy. In this paper we discuss the nature of investments in children and sketch out the diverse kinds of inputs to the developmental process across different countries at selected time points. The observable inputs are time and goods and they can arise both in the home and in formal care settings. Estimates are given for Sweden and the U.S. The mere size of the total of these investments in early human capital, more than 20 percent of GDP for Sweden, raises a number of interesting questions.

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I. Introduction

In the late 1970's Tom Juster became interested in using time diaries as part of a system of national accounts. The most comprehensive approach along these lines was sketched out in a framework where total social output is constrained by the available resources of capital and time (Juster, Dow, Courant, 1985). Time can be split into three broad uses: production of goods and services in the market; household production of non-market goods and services; and leisure, personal care and biological maintenance. The aggregate of time available must be in these categories and the allocation is driven by traditional efficiency motivations including the importance of social capital or 'societal variables' and 'contexts' which are not under the individual's own control but have various public good or externality elements. Intervening variables shaping these choices are market wage rates, the available technology, and preferences of individuals. The final outputs are Becker-Lancaster like non-market basic commodities or characteristics (Becker, 1965; Lancaster, 1966) which are arguments in the individual's utility function.

Household activities combine with GDP-type goods used directly by households to produce tangible and intangible output. In this system measurement of a broader concept of investment was a key motivation. Further, the locus of any activity could shift between market and non-market sectors, so a less comprehensive measurement system would be vulnerable to technical shifts which alter the sectoral location of activity. To illustrate: "A new technology (television) can reduce market sector output (movie attendance) and increase nonmarket output (viewing movies at home) with the major net impact of reducing expenditures for transportation. Expanding publicly financed day-care facilities or nursery schools can increase government activity devoted to skill development of children, while simultaneously decreasing nonmarket investment of parental time devoted to child care, without having any impact at all on the aggregate level of skill development of children."

To the more current emphasis on the rise of human skills as a rising share of the total capital stock (Tinbergen, 1975), an important possibility is that there are shifts back toward the non-market sector (as in the television example) and that the greater resources in the form of market

purchased inputs in the U.S, 1950-1990[1] have been matched by smaller or larger per pupil investments in non-market time by parents. One might expect larger investments by parents, particularly for very young children, if these early home investments provide a type of 'enabling' capital or values and preferences which improves the ability to acquire additional human capital at higher levels of out-of-home schooling and respond to changing environments throughout the life cycle. This greater home investment could be all the more important if the home educational sector is characterized by the absence of productivity-enhancing technical change (Baumol, Batey-Blackman and Wolff, 1985). Then resources are absorbed in disproportionate share into this activity, just as more resources are claimed by the service sector or the R and D sector.

An estimate of child investment time - hours per week - by U.S. fathers and mothers for children age 0-2, 3-4, 5-17 was offered in a paper entitled, "Investments of Time by Men and Women" (Juster, 1985a). The estimates for 1975-76 were about 1 hour per week for men with preschool children and 4 hours per week, 2.5 hours, and 1 hour for women with children in the age ranges, 0-2, 3-4, and 5-17, respectively. The investment definition was diary-based 'time spent in helping children make or do things, in teaching them new skills, and providing for their health care plus .5 of the time spent caring for, reading to, talking to, playing with and being a chauffeur of one's children' (p. 186). This definition implies about 250 hours per year of investment time by parents per very young child as of the mid 1970's. Suppose one knew that that 'teacher's' time (defined as out of home care by a non-relative) were another 150. This totals 400 hours per year of 'investment time' but what is the value on a cost basis? The adult time has a possible wage cost, and, to illustrate, at $10 per hour, annual human investment would be $4,000.

Should we develop some accounting for the child's own time? This makes sense if the effort on the part of young children has increased, and there is evidence that across countries, the effort expected of children, even at the grade school level can differ substantially. As of 1981-82, primary school children in the U.S. put in 27.0 hours of school work (25.2 in school and 1.8 studying outside of school) while in Japan in 1986 primary school children put in 46.5 hours of school work (38.2 in school and 8.3 studying outside of school (Juster and Stafford, 1991)). While a wage rate approach seems implausible (as the basis for a cost of investment approach) one might then ask if the study time leads to more skills which eventually are reflected in market wages

[1] The average real per pupil expenditure relative to the earnings of a 40 year old male high school graduate has risen steadily from .060 in 1950 to .094 in 1970, and then to .189 in 1990. (Johnson and Stafford, 1996).

(the value of market output approach). The latter approach has the obvious drawback that the market value of skills can shift through time (Freeman, 1975; Johnson and Stafford, 1996), but such issues of cost versus market value are familiar to those studying physical capital. For this reason one may simply want to keep investment hours to a child by each caregiver type (including 'own' - child time) as separate, but including measures of cognitive development which in turn depend on the investment time would be very important from the perspective of investment. (The cognitive development measures are an important part of the forthcoming study of time diaries and child development, PSID, 1997).

In this paper we set out a more narrowly defined investment paradigm (*Sections II and III*) and sketch out the diverse kinds of inputs to the developmental process across different countries at selected time points *(Section IV*). The observable inputs are time and goods, and they can arise both in the home and in formal care settings. These formal care settings can be purchased by the parents or provided as market goods but through the public sector (as with public schooling). While at a high level of aggregation one can think of out-of-home settings as a type of market good (purchased privately or by the public), there are important issues concerning the use of adult time and instructional style which produce learning in these out-of-home settings. In the educational literature there are studies of time-on-task within the classroom setting as measured by observational classroom diaries. The more micro level issues of what time and goods inputs matter the most is not a topic which can be addressed in our paper. Indeed, this is the entire interdisciplinary field of child development research.

II . An Investment Paradigm

A. Overview

Most societies put a high priority on having children and on giving their children a better life than their parents. Older generations do not only transfer material wealth to younger generations but also, and probably more importantly, human capital. By providing good care, good health, material wealth and schooling young generations are given the knowledge and experiences of the older generations as well as the tools to develop this human capital further.

The care and schooling of children has been the topic of research in several disciplines using many different approaches. In economics child care and schooling are viewed as investment

activities. Parents use their own time and purchased goods and services to give their children human capital in the form of knowledge, experiences and good health. In some cultures parents get a return on their investments when their children later work in the market and contribute to family income, particularly when the parents get old. To have many children is thereby old age pension insurance in these cultures. In our modern Western societies this motive to invest in children has no longer the same importance.

It is still true that the working generations provide for the retired generations, but it is now done in collective forms and via market investments across families (Lee, 1994), and there is usually only a weak link (if any) between the child's human capital and the well-being of its parents. My pension is thus not decreased if I neglect my children and use all my resources on myself (it might even increase!) provided everyone does not act in the same way. From a collective point of view it is, however, of utmost importance that the parental generations invest in their children and that these investments generate economic growth. If not, the parental generations will have a loss of well-being when they retire since there will be reduced output to support both the economically active and dependent populations. In a collectively responsible society there are compelling reasons to invest in children. It also suggests that we could measure the return on these investments by their contribution to economic growth, which at the individual level implies that the return on the investments made in one child could be measured by its contribution to the production of goods and services. The share of this contribution which goes to the market could thus be measured by the stream of lifetime earnings, while the measurement of the share which goes to the nonmarket sector is less obvious.

Quite independently of our self interest (individually or collectively) when retiring, most people would probably acknowledge that it is important to have children and to give them a good start in life. If a natural instinct, an altruistic concern for one's children and future generations, or a selfish satisfaction of consuming kids, most people want children and enjoy having them. As shown by Juster (1985b) and Flood and Klevmarken (1990) playing with kids and taking care of children is the activity which gives the highest "process benefit", to borrow Juster's terminology.

In work on the economics of the family Becker (1965, 1981) and Willis (1973) made the distinction between the number of children a couple may want and the skills, knowledge, and experiences, called quality, the parents wish to give their children. Using this distinction, they were able to explain why rich parents do not necessarily want to have more children than do less

well to do parents. They rather prefer children with more "quality". Thus, in this model both the quantity and the quality of children contribute to the satisfaction of the parents. If quality is more income elastic than quantity the interaction between quality and quantity can lead to an apparent negative income elasticity of demand for quantity. Utility is also a function of non-child related consumption and parents are assumed to make a choice between the number of kids they want, the resources they want to allocate to the children and other non-child related consumption so as to maximize their joint utility subject to an intertemporal budget constraint and a time constraint. The more children they choose the less time they will have for market work and leisure activities and the lower their (non-child) consumption standard becomes. In Gronau's model (Gronau, 1973) there are two aggregate commodities which give utility, "child services" and a "consumption standard", but utility is independent of how these commodities are produced. The model does not accommodate Juster's idea that the investment process as such gives utility (process benefits), just that the result "well-behaved children" do. The introduction of Juster's process benefits makes the distinction between investments and consumption fuzzy. If parents efforts to bring up their children is solely motivated by the joy and satisfaction they get by doing it independently of the result, then what we would normally call investments in children is only consumption **or** produces **both** consumption and investment as outputs.

In this paper we will emphasize the investment aspects of having kids rather than the consumption aspects. One starting point is the scheme laid out by Leibowitz (1974). The approach indicates how the parents' genetic endowment, socio-economic background, living circumstances and investments in their children determine the children's adult production ability and living standard. Leibowitz's figure is modified to include out of home early investments and is reproduced as Figure 1. It shows that home investment consists of the quantity and quality of time inputs and the quantity and quality of goods inputs which, jointly with inherited ability, will determine the level of schooling which finally will influence post-school investments and income. We may thus distinguish between home investments and investments outside home, and between time investments and goods investments.

B. A Model of Parental Investments in Young Children[2]

1. A Life Cycle Model and the Role of Early Investment

We begin by specifying a model of lifetime skill acquisition beginning with the individual's inherited or genetic endowment and going through two time periods. During the first time period (childhood), the individual's parents or other adults invest in his ability to learn. In this stage the individual is not making explicit decisions about his own "career" but, rather, is having these decisions made for him. In this section we will treat these investments as simply given. This is for the sake of steering clear of a full modeling of the complex intergenerational issues and to allow more focus on the investment aspects of the problem. We define three types of human capital and four time points and two corresponding time intervals:

K_0 = initial inherited endowment of ability;

K_1 = early human capital from home and school investments or 'enabling' capital;

K_2 = later or marketable human capital;

and

T_0 = initial time period (birth);

T_1 = point in time ending the home investment process (given);

T_2 = point in time beginning the self-investment or training process and market earnings (given) $T_2 \leq T_1$;

T_3 = end of the training and market earning period.

During the home interval ($T_0 \leq T < T_1$), a stock of skills relating to the ability to learn or enabling capital (K_1) is built up through investments of time by parents and other family members (h) and by market inputs chosen by the parents (M_p). These market inputs can also include the purchase of adult time (via day care, for example). In addition to market purchased inputs to K_1, there are publicly purchased inputs such as schooling (G) which, in turn, are purchased time inputs of teachers (h_g) and other goods and service inputs (M_g). There are also child-dependent subsidies to the parents. For example, housing allowances for families with young children. These subsidies may be tied to expenditures which are inputs to the children's development (K_1) or may simply be, in effect, income transfers. In this case the impact on inputs to the child would be via income

[2] This section is adapted from Hill and Stafford, 1978.

effects on the parental demand for child quality, as we will discuss in Section 2 below, and via income effects on h and M.

There are two empirical issues in the home time by the parents. First, as we will see in Section III, a great deal of child care time is joint and intermittent with other activities. A parent can be watching television as a primary time use and intermittently talking with the child. As an investment input such 'secondary' child care time is some fractional value of primary, one-on-one child care time, so it needs to considered in empirical work. Parents may also experience child-induced drudge work. Additional chore time is observed in families, particularly with young children. An approach to characterizing such time is to think of it as home produced 'goods' inputs. One could hire a housekeeper or buy Pampers; alternatively one could produce the services in the home via added drudge work.

To simplify discussion we take T_1 as given, and, during the home period, the stock of early human capital is accumulated by the following equation:

(A1) $$\dot{K}_1 = Q_1 = Q_1(K_0, h_1, h_2, h_3, M_p, G(h_g, M_g), K_1; t)$$

h_1 = home time on child by mother

h_2 = home time on child by father

h_3 = home time on child by other family members

t = a time index to portray the age of child dependent developmental process.

The presence of the fixed factor, K_0, generates rising marginal costs of producing increments to early human capital per unit time. Of course the major research challenge is to measure the relevant inputs and their role in producing cognitive and social skills of young children. In part we can think of K_1 as including the decision making capital of young children or, still more broadly the child's preferences and orientations. The production of K_1 can be shaped by the social context or social capital (Coleman, 1990). Any depretiation of human capital during this first period of childhood is assumed negligible.

At time T_2 and beyond the individual makes his own decisions about training time, consumption time and labor market time. Financial assets (partly from the family) available for consumption and market inputs to investment (possibly including publicly supported higher education) can be defined as $R(T_2)$ or in the from of an interest rate. Individuals from high-income backgrounds have more financial assets available for consumption and out-of-pocket costs for training.

During the later period marketable capital is produced with own time (s), market inputs (D) and human capital of all three types.

(A2) $$Q_2 = Q_2(K_0, K_1, K_2, s, D; t)$$

The accumulation of marketable human capital is given as:

(A3) $$\dot{K}_2 = Q_2(\cdot) - \delta K_2 .$$

The production function $Q_2(\cdot)$, now has the fixed factors K_0 and K_1 which assures rising marginal costs. The early childhood investments (K_1) are now 'there', for better or worse, and it is assumed that the benefit of these investments is largely in the form of 'cost savings' in the production of the later stage human capital. In the second stage the child is now 'adult' or adult enough to make decisions with the parents only able to offer advice. In principle, somewhere in this stage the adult child also has own leisure time, market expenditures, and own children and their development as arguments of the objective function. Specification of this would be a step toward an intergenerational model, an effort which we will forgo at this point. From the perspective of the empirical work in this paper, the question is measuring the level of resources going to the production of K_1, but the other critical element is how K_1 shapes the cost of acquiring K_2.

If the objective function is the discounted utility

(A4) $$J = \int_{T_2}^{T_3} U(c, X)\, dt$$

subject to (A2), (A3) and a financial budget constraint

(A5) $$\dot{R} = (1 - c - s)\alpha K_2 - pX + rR$$

where c is leisure time, s is training time, (1-c-s) is market work time, X is market goods with price p, R is financial wealth, and α is the rental value of marketable human capital. From the original parental perspective the level of K_1 will allow a higher optimized value of J. That is, if parents have as an argument in their utility the welfare of their children, then in choosing a level of

home training they will 'look at' the incremental value of the optimized performance index (J) for each of their N children in determining their decision to increase early or enabling capital.

Since parents care about the lifetime well-being of their children, the time input to child development is both an investment for the child and an indicator of parental satisfaction. For children with more enabling capital in stage I (the home interval), what can we expect to see in their adult life cycle? There are numerous models of (A1) - (A5), and if we postulate a logarithmic Cobb-Douglas production function for (A2) and a particular simple functional form for utility in (A4) [$U = \ln (A_0 c^{\theta 1} X^{\theta 2})$], the first order conditions for the path of human capital are given by

$$\text{(A6)} \quad \dot{\lambda}_{K2} = \lambda_{K2}\delta - \lambda_{K2}\alpha + \frac{\Theta_1}{K_2}$$

where λ_{k2} is the shadow price of K_2, and

$$\text{(A7)} \quad \dot{K}_2 = K_1\left[\beta\lambda_{K2}K_1 / (\lambda_R\alpha)\right]^{\beta/(1-\beta)} - \delta K_2$$

In the case of greater enabling capital (K_1) from the home segment, (A6) and (A7) imply a more extended training phase would be predicted. This is portrayed by Paths 1 and 2 in Figure 2a. Path 1, based on a high early level of enabling capital, implies a greater and growing value of marketable human capital throughout much more of the lifetime with a decline to the boundary condition (the dynamic shadow value of additional marketable human capital, $\lambda_{K2} = 0$ at the end of life = $T = T_F$).

Alternatively, if the home segment simply provided more marketable human capital (K_2) but not greater ability to learn, then we would expect that the children from backgrounds with more parental and early school inputs would follow a path such as Path 2, initially training **less** and working **more** in the market than Path 1**,** but then later in life would have earnings which converged toward those who received less home and early school training (Ryder, Stafford, and Stephan, 1976). Paths 1 and 2 imply the life cycle labor supply differences (l_1 and l_2) sketched out in Figure 2b. If one accepts these arguments about the role of early investments in children, then it is implied that the value of early home investments will be seen only from longer panels where one can observe the lifetime behavior and outcomes of the children as adults.

2. Parents' Education and Child Care Time

In many countries a strong empirical relationship between parental education and child care time has been observed. We offer a few brief remarks to explain this pattern. Following Willis(1973) and Becker and Lewis(1973) and assuming that a family utility function is maximized with respect to its arguments - number of children, child quality and all other goods - subject to a household production function and a budget constraint, it can be shown that the compensated wage elasticity of child care time is likely to be negative. The argument is fundamentally that an increase in market wage of the parent raises the marginal cost of child care relatively more than that of other commodities because child care is more time intensive. The explanation for the observed greater time in child care for more educated parents then rests on a positive and relatively large income elasticity of child quality. Further, as distinct from other household activities, the production of child care probably exhibits a very low elasticity of substitution between goods and time and accounts for a large fraction of the family's full budget.

III. Measuring investment inputs

A. Time Investments at Home

Time investments at home are predominantly, but not exclusively, by parents, who decrease their market and leisure time to care for their children. A few studies have pointed out that in addition to income forgone while a parent is at home taking care of children there is a dynamic shadow price, λ_{K2} above, of the forgone opportunity to invest in additional own human capital and build up future earnings. These estimates (Smith and Ward, 1989; Joshi, 1990, 1994; Calhoun and Espenshade, 1988; Dankmeyer, 1996; Stafford and Sundström, 1997) indicate a substantial cost of this sort. In the Netherlands, this 'time out' appears to be very costly for women with less schooling, since the market work experience is even more important for their careers (Dankmeyer, 1996).

Time investments may also be done by the extended family and friends or by others who with or without compensation, for instance, baby sit, give care or lessons. One may even see socializing with relatives and family friends as an investment activity or the production of social capital (Coleman, 1988) which shapes child development, notably including values and preferences of children.

We might further wish to distinguish between different kinds of time inputs. One is the direct care of a child, an activity in which the child (children) is the primary target, for instance feeding a child, dressing a child, reading to a child or helping out with homework. People commonly do more than one activity at the same time (or, in Juster's view switch back and forth between activities in a way which makes it hard to distinguish each separately). For instance a mother might be cooking and helping with home work at the same time. Depending on which activity the mother considers to be her 'primary activity' (in time-use studies) that is classified as the primary activity and the other as a secondary activity.

Both primary and secondary activities could involve investments in children. There are also activities in which the child is not the primary target but the child is present when the activity is done. A family could, for instance, have a meal jointly or they could be doing some kind of sports or outdoor activity together or a child could simply be watching when an adult is doing something. These activities may also include investment aspects, i.e. the child is learning while watching and doing. Finally, there are activities in which the child is not present but which are carried out to the benefit of the child, for instance, the child's dirty laundry is washed and ironed, or a meal is cooked for the child.

It is not obvious how one should go assigning investment measures to these diverse forms of activity. Time-use studies give the time input of parents (and others) into direct child care and sometimes also data on other episodes during which children are present. Time-use for the benefit of children without them being present can usually only be estimated indirectly (c f below). Most current time-use studies only give estimates on the time use of the adult, but not on how much time was spent on each child. Simply averaging by the number of children in the family will not do because in some activities a child might benefit as much from the activity doing it jointly with other children as by doing it alone. Indeed, there are activities like certain games which require more than one participant. Also, parents and school-based caregivers may provide unequal amounts of time to siblings. One apparent motivation is a type of intra-school or intra-family equity (Brown and Saks, 1975, Gustafsson and Stafford, 1997). The literature on child investments also discusses the importance of the order of birth among siblings for the level of parents' time investments as well as the transmission of human capital between siblings. There are, for example results indicating that the first and last child receive more attention from parents than do middle children (Hanushek, 1993).

Ideally one would need child time diaries. Even for diaries of individual children in the same family there are questions of 'scale economies' or public goods. In this case adult time for one child is not at the expense of the other children and, as in the example of organizing a game, the value is from the team element (as defined in economics (Radner, 1986)). One view is that formal school settings consist heavily of those activities where there are scale economies or public goods for adult time in the learning process.

Measures of time input are not necessarily good measures on investments for at least two reasons. First, as noted above, an activity might be done both for its investment contents and for its consumption benefits and it is difficult to separate the two. Second, the quality of the input of hours and minutes might differ. Is one hour of TV-viewing equivalent to one hour of homework? To what extent does content of the TV show or homework matter? It might be possible to rank activities as to their investment contents and more or less arbitrarily weight the time-use proportionally to this. If measures on the return on child investments were available these could be related to the time input in various activities and one could in this way assess their relative importance. In the absence of return measures any such operation involves many ad hoc judgments.

An alternative approach to measuring investments is the 'cost of time approach'. That is, time inputs are converted into monetary inputs by using either a wage rate of the person doing the activity or, if there is a market alternative, what it would cost to purchase the service or good produced. This approach is easiest to defend when there are true opportunity costs or market alternatives, when this is not the case any monetary evaluation becomes rather arbitrary. If, for instance, a woman gives up her job to care for her children, then there is a recognizable opportunity cost, but if a housewife gives up some of her leisure to care for her children the opportunity cost is less well defined.

B. Time Inputs Outside the Home

From an investment perspective the most important time input outside home is certainly time in preschool and school activities. Here, an underlying factor is the presence of greater scale economies in instruction and learning as children become more developed, and, as with in-home capital formation, there are quality differences between time on task at school, for instance, and leisure and break time. We might also believe that certain tasks at school have more investment

content than others. Outside school there are also activities which contribute to the human capital of a child. There are more or less organized post-school activities which aim at teaching the child certain skills, but also socializing among other children gives the child useful experiences about group behavior and how to establish relations with others. The playground is an important arena for investments in human capital! For most countries we currently lack measures of time inputs outside the home, except for a few classroom surveys, none of which are based on national samples. Time-use surveys only give data on the time adults interact with children. We need child time-use diaries also for this purpose, particularly of the day at school or other out-of-home activities.

Estimates of the monetary value of these out-of- home investments would have to build on estimates of the value of adult time input, especially for young children, and the value of any goods input. In this way it might be possible to estimate, for instance, the investment value of preschool and school activities. Similarly, for a sports activity one might like to add the time cost of an adult coach and the rental value of the sports ground and any equipment. A problem in this case is though, that one also might like to subtract something for the consumption benefit of sporting. For child activities which neither involve any adults nor any equipment there is no monetary estimate obtainable from the cost side. For children at older ages, their own time and its opportunity cost becomes more important. In higher school grades there are higher pupil/teacher ratios, so the active engagement of the child and forgone market earnings become important (Hansen, 1963).

C. Goods Inputs

Considerations similar to those for the time input apply to the input of goods. For some goods it is possible to uniquely identify them with the children of a family, for instance clothing for children (but not necessarily with individual children as younger siblings inherit from older siblings), while goods like furniture, TV-sets and the home in which the family lives are jointly consumed by all family members. One may buy a larger home, more furniture and more than one TV-set if there are children in the family but it is not possible, for instance in a family expenditure survey, to unambiguously say that such and such a share should be viewed as used by or for the children. With some modeling it is possible to estimate the incremental consumption expenditures due to children.

Using such measures of incremental expenditure for the goods input as an investment implies that these expenditures on children are in fact investment expenditures. The child does not consume at all! A candy bar is probably consumption, but is a hamburger a nutritional investment? As a first approximation, the only way to proceed is to empirically relate such goods inputs to some intermediate (developmental) capital in the broad schematic of Figure 1. [3]

Goods inputs outside the home involve purchases by someone other than the child's parents or other family members. For instance, scholarships and grants given to the child could be used to buy the services of a school. In most countries compulsory schooling is paid for by the public and in some countries the public also covers most of the direct costs of both pre school and post compulsory schooling. These public costs should be viewed as investment costs, but the question arises of the return on the investment. Otherwise, they may effectively be a type of transfer payment to the parents, possibly to support consumption.

In some countries the public also give additional support to families with the intent that this support provide resources to children. These benefits may take the form of cash transfers to families with children of certain age or to mothers (and fathers). If from a subsidy the parents give up market work, do they allocate added time to child care? Are the subsidies also used to increase the expenditures on goods inputs to the children? For the labor supply substitution to child care, the investment cost (opportunity cost of not working) is usually shared between the parents and the public, with the public carrying the larger part, at least during the first year after a child is born. There are also housing benefits targeted for families with children. In some countries benefits are given in the form of income deductions before tax or tax credits rather than in the form of cash benefits. In the case of maternity benefits and family allowances for parents who stay at home to care for their children the potential investment character is rather obvious, but less so for other benefits. If the housing benefits simply reduce the expenses which would otherwise have gone to housing, the net result is just somewhat greater family income, and the issue then becomes the income elasticity of demand for child quality and the induced time and goods inputs which would make an incremental contribution toward that objective. An interesting case is special health care expenditure for young children (Gustafsson and Stafford, 1997). Here there is a tying-in of the benefits which may reduce the extent of such budgetary substitution.

[3]The widely used HOME Scale (Mott, 1990 in the NLS) , and altenative measures in the PSID NICHD Child Supplement, provide rough indicators of physical resources (food, clothing, books, ...) available to young children.

IV. An Overview of Time and Goods

A. Time Inputs at Home

To the extent measures are available, this section aims at assessing the total magnitude of time investments at home for selected countries and years. Table 1 gives time-use estimates in child care for a number of countries ranging in time from the beginning of the 1970s to the beginning of the 1990s. On average males provide about 0.2 hours per day for primary child care time and females 0.4-0.7 hours, depending on country and year. These estimates include all families whether they have own children or not. Time-use in child care differs of course very much between families with children and families without. The age of the children is also important as shown by Table 2. Families without children use little time in child care. Bulgarian females are an exception. It is likely that the extended family is more important for the upbringing of a child in this country than in most other Western countries. (The high estimates for Sweden and Married aged 16-44 with no children are probably due to small sample size.) In families with small children (below 7) males spend on average 0.5-1.0 hours per day in child care and females between 1.5 and 3 hours. In families with older children the corresponding estimates are lower 0.2 hours per day for men and between 0.2 and 0.7 for women. Considering the relatively high Swedish labor force participation rate it is interesting to note that Swedish women use less time in child care than women in the other countries.

Table 3 exhibits estimates for three Scandinavian countries of parents time with their children including child care **and other activities** during which the child is present. The overall averages for males range from 4.1 hours per day to 5.5 hours per day depending on country and for females the estimates range between 5.7 hours and 8.1 hours. It is of course difficult to separate country effects from annual effects, but given the similarities between these Scandinavian countries, the lower estimates for Sweden 1993 might suggest that parents now spend less time with their children than they used to. Table 3 also shows how time-use depends on the age of the kids. The younger the children the more time parents and, in particular, women spend with their children.

Table 1

Average Child Primary Care Hours Per Day,
by Country and Gender, Selected Years

Country/year	Males	Females
Bulgaria 1988	0.1	0.5
Finland 1979	0.2	0.4
Finland 1987	0.2	0.5
Hungary 1976-77	0.2	0.5
Hungary 1986	0.2	0.6
Norway 1971-72	0.2	0.6
Norway 1980-81	0.2	0.6
Sweden 1984	0.2	0.5
Sweden 1993	0.3	0.5
USA 1975/76	0.2	0.7

Note: This table gives averages for all individuals whether they live in families with or without children.
Sources: Kiravainen, et. al.(1992); Barbarczy, Harsca and Paakonen(1991); Neimi Kiiski and Liikanan(1979); Lingsom and Ellingsaeter(1983) and The Time Budget Survey 1980-81 from The Central Bureau of Statistics of Norway, Oslo 1983, and own computations for Sweden using HUS-data see Klevmarken and Olovsson(1993) and Flood et.al.(1997).

Table 2

Average Primary Child Care Hours Per Day
by Marital Status and Gender, Selected Years

Country/year	Singles 16-44 no Children	Singles with Children	Married 16-44 No Children	Married 45-74 No Children	Married Children<7	Married Children 7-18
Males						
Bulgaria 1988	0.0	0.2	0.1	0.1	0.5	0.2
Finland 1979	0.0	0.3	0.0	0.0	0.9	0.2
Norway 1971/72	0.0	0.1	-	0.0	0.5	0.2
Norway 1980/81	0.0	0.4	-	-	1.0	0.2
Sweden 1984	0.1	0.4	0.1	0.1	1.0	0.2
Sweden 1993	0.0	0.1	0.1	0.1	0.9	0.2
Females						
Bulgaria 1988	0.1	0.9	0.2	0.3	3.0	0.5
Finland 1979	0.0	0.7	0.0	0.0	2.5	0.2
Norway 1971/72	0.0	0.6	0.0	0.1	2.1	0.7
Norway 1980/81	-	1.0	0.0	0.0	2.3	0.6
Sweden 1984	0.0	0.5	0.6	0.1	1.8	0.3
Sweden 1993	0.0	0.5	0.3	0.1	1.5	0.4

Sources: Same as for Table 1 with the exception of Barbarczy et.al. (1991)

Table 3

Average Total Child Related Hours Per Day with Own Children
by Age of the Youngest Child and Gender of Parent

Country/year	Males				Females			
	0-6	7-12	13-18	All	0-6	7-12	13-18	All
Finland 1979	5.3	5.3	6.1	5.5	9.2	7.1	7.4	8.1
Norway 1980-81	5.3	4.5	4.2	4.8	9.1	6.9	5.1	7.4
Sweden 1984	5.5	4.0	2.8	4.3	8.7	5.4	3.5	6.1
Sweden 1993	5.1	4.3	3.0	4.1	7.8	5.2	3.7	5.7

Note: Time-use estimates include **both** active child care and other activities with children present.
Sources: Use of time in Finland 1979, Studies no 65, Central Statistical Office of Finland, Helsinki 1981, pp. 60-61. The Time Budget Survey 1980-81, Table 59, Central Bureau of Statistics of Norway. B378, 1983. Own calculations using the Swedish HUS surveys 1984 and 1993.

Comparing Tables 1 and 2 with Table 3 highlights the 'joint products' problem in studying child care. Much child care takes place in conjunction with other activities. Is this joint activity less important? Is one-on-one child care a measure something closer to 'quality time'? Two approaches to resolving these questions are the 'value' approach and the 'cost' approach. In the value approach the weight for joint time versus one-on-one time can be determined by the relationship of joint versus one-on-one time to impacts on various developmental outcomes at later ages, and then to longer term outcomes such as completed schooling and earnings. In the cost approach one would reduce the investment in time by allowing for the fact that multiple outputs are produced. The simplest method being to give joint time a lower investment weight. Regardless of how to best proceed here, it is evident that joint time is a large share of total child time, particularly for fathers.

Another drawback with these tables is that they do not tell us how much of adult time each child gets. In countries with a high fertility and large families average time for child care is likely to become higher than in countries with a low fertility. But in families with many children they are likely to use adult time jointly and we also know from other studies that the incremental time for an additional child levels off rather rapidly with increasing number of children. For these reasons we will also estimate incremental time use in child care and household work.

B. Incremental Housework and Child Care Time

Children's development also involves some baseline maintenance efforts by the parents. In this view parents have a quartermaster function. While not thought of as the critical developmental input, resources are involved, as are interesting aspects of intrafamily decision making. In Juster and Hill (1985) it was shown that allocation of time by the spouses to these activities appears to be related to relative wage rates of the spouses, but when sex of parent was added the predictive power of relative spousal wages was reduced dramatically. It was further shown that drudge work time arising from the presence of young children cut into shared free time of the spouses and increased the probability of marital instability (Hill, 1988).

Here we provide a selection of estimates of housework time and its relation to children in different age ranges. In Table 4A we have incremental housework, including child care, based on reports of housework, including child care for the United States. For higher socioeconomic status

(SES) families, children under 6 appear to be receiving on the order of 1-2 hours per day, based on time diary estimates, but, from Table 4B, only on the order of 1 hour per day based on respondent reports of housework. In Table 4C the child care and housework components are separated, based on the 1975-76 time diary study for the U.S. For mothers with educational attainment of some college or more, we can see that the total incremental child care time for the youngest of about 800 hours per year (859 hours) is divided as 485 hours for direct child care and 374 hours of incremental housework. Children take time!

Table 4A

Annual Per Child Hours of Mother's Care
and Socioeconomic Status (SES), United States

		M E A S U R E	GROUPS		
YEAR	STUDY	INCREMENTAL HOUSEWORK[a]	HIGH[b]	MIDDLE	LOW
		(from Diary)	SES	SES	SES
1965	Time Use	Children Age 0-2.99	741	352	494
	I		(237)	(149)	(109)
		Children Age 3 - 4.99	489	508	-23
			(189)	(157)	(104)
		Children Age 5-6.99	455	496	-158
			(229)	(144)	(126)
		Children Age 7- 17.99	164	198	-37
			(97)	(63)	(39)

Table 4B

Annual Per Child Hours of Mother's Care, United States

		INCREMENTAL HOUSEWORK[a]	LOW	LOW	HIGH	HIGH
		(Respondent Hours Reports)	LOW[c]	HIGH	LOW	HIGH
1969	PSID	Children Age 0- 6.99	156	299	343	434
			(33)	(104)	(72)	(74)
		Children age 7-17.99	49	119	45	128
			(20)	(74)	(47)	(50)

[a] Housework includes child care [b] Socioeconomic status as measured by the Duncan index
[c] Less than some college education, both head and wife

Table 4C

Annual Per Child Hours of Mother's Care, United States

YEAR	STUDY	INCREMENTAL CHILDCARE (Primary time from Diary)	13+ YRS ED	9 -12 YRS ED	< 8 ED
1976	Time Use II	Children Age 0-2.99	485	383	386
			(37)	(38)	(81)
		Children Age 3 - 4.99	218	261	120
			(45)	(38)	(75)
		Children Age 5 - 12.99	142	77	42
			(19)	(16)	(29)
		Children Age 13 - 17.99	52	6	-3
			(23)	(26)	(43

YEAR	STUDY	INCREMENTAL HOUSEWORK[d] (from Diary)	13+ YRS ED	9 - 12 YRS ED	< 8 ED
1976	Time Use II	Children Age 0-2.99	374	171	62
			(75)	(80)	(165)
		Children Age 3 - 4.99	389	328	-131
			(89)	(79)	(153)
		Children Age 5-6.99	150	120	-62
			(37)	(35)	(60)
		Children Age 7- 17.99	164	233	-28
			(45)	(54)	(88)

[d]Other than child care

Tables 5A and 5B present incremental time for children based on Swedish time-use data. The U.S. and Sweden show noticeable differences! From Table 5A we find that on average one-on-one incremental child care time is only about 100 hours per year in Sweden. The estimates of incremental household work other than child care are also low compared to the U.S. (Table 5B). Males increase their household work by about 50 hours per year and child for very young children, and the corresponding estimate for women is about 200 hours.[4] The older the children the smaller these estimates become. Because there are clear birth cohort differences in the time allocation to household work, younger cohorts do less household work, a few birth cohort variables were added to the regression models. As already mentioned in section II.B.2 there are also differences in behavior related to schooling. Although the estimates for Sweden are not well determined they indicate that more educated women use relatively more time in child related household work if the youngest child is older than 2 years. For the youngest there is no difference due to schooling. The results for the U.S. are even more clear cut. Independently of the age of the children women, with more schooling use more time in child related household work (Tables 4B and 4C). Why is there more incremental housework by more educated women? Why weren't these activities more likely to be 'outsourced' for those with higher market wage potential and a presumed higher value to career enhancing activities? Do more educated women have higher preferences for child quality as reflected in a higher income elasticity?

The analysis of the 1984 time-use study in Flood and Klevmarken (1989) provides additional details. Using a Tobit-type selection model they obtained only small and insignificant effects of children on household work other than child care in addition to the positive effect of household size. The marginal effect of household size was estimated to 127 hours per year for males and 204 hours for females, but only the latter estimate was significant. For child care activities the results were reversed, the effect of household size was small and insignificant while parents' time in child care increased for every child, in particular every young child. According to the point estimates, women increased their time use in child care by 214 hours for every child below four and men increased their time by 138 hours. Flood and Klevmarken also showed that the increased time for child care and household work was compensated primarily by a reduction of market work, in particular when the kids were young, but also by a reduction of leisure time. Men

[4]The variable used in the regressions of Table 5B are interactions of the number of siblings and dummy variables for the age of the youngest child.

also decreased their time for sleep and rest somewhat, while women with young children increased it. There are similar results for the U.S. Hill and Stafford(1980) showed that for American women, the incremental child care time and housework time associated with children was 'financed' by reduced market work, passive leisure and sleep.

In comparing the typical patterns of time-use for child care and child related household work in the two countries we thus find that Swedish parents in the 1980s and 1990s spent a little less time in these activities than did American parents in the 1970s. Without further study it is currently only possible to speculate about what caused these differences between the two countries. It is conceivable that an explanation could be found in the difference in labor force participation between U.S. women and Swedish women. The Swedish female labor force participation rate was higher, which at least partly is explained by the supply of inexpensive public child care. It is conceivable that to some extent care at home by parents have been substitued for care at public nurseries. The results from the study by Gustafsson and Kjullin(1994) confirm such a conclusion.

Swedish public policy may also have changed the intrafamily bargaining process compared to the U.S. (Rosen, 1995; Sundström and Stafford, 1992). As an interesting look at intrafamily child care decisions, Table 6 shows time with and without children for Sweden in 1993. What seems quite surprising is the rather equal time by men and women, both in direct child care time and in other activities with children present. As of 1976, U.S. men spent very little time in child care, about 2.25 hours per week, and that was only for college-educated men with children under age 5 present. Changing gender roles in the care of young children may have also taken place in the United States since 1976.

The differences across countries (Sweden and the Unites States) in 'induced' housework time because of young children, combined with the joint child care estimates of Table 3, highlight the need to measure a wide array of time inputs in order to quantify investments in children. The routine housework costs of children also raise the question of how to value such 'inputs'. From a cost perspective, things seem clear. The added housework is a cost and especially since these activities are rated as having the lowest intrinsic satisfaction or 'process benefits' (Juster, 1985). From a value perspective, does one really expect more routine chore time to lead to better school performance? Will Swedish children have less success in school because of less drudge work by their parents?

Table 5A

Incremental Child Care Estimates by Years of Schooling for Sweden (Primary time from diary, Hours/year)

	Years of schooling			
	<=9	10-12	13-	All
1984	83 (7)	115 (12)	97 (14)	102 (6)
1993	72 (4)	130 (14)	96 (12)	111 (7)

Note: The estimates were obtained by regressing primary time in child care on the number of children in the family including families with no children.

Source: HUS-data, see Klevmarken and Olovsson(1993) and Flood et.al.(1997)

Table 5B Estimates of Incremental Housework other than Child Care by Gender and Years of Schooling, Sweden 1993 (Primary Time from Diary, Hours/year)

	Less than 13 years of schooling		At least 13 years of schooling		All levels of schooling	
Males						
Birth cohort						
1929-38	587.6	(122.6)	409.0	(165.7)	543.5	(97.9)
1939-48	377.8	(119.7)	306.3	(150.9)	351.7	(93.7)
1949-58	411.8	(125.9)	308.3	(153.4)	377.1	(97.0)
1959-68	231.1	(126.0)	71.6	(153.2)	175.0	(97.3)
No of siblings * the age of the youngest child						
- 2	48.7	(50.7)	43.5	(59.5)	49.2	(38.7)
3- 4	16.0	(62.9)	46.1	(47.6)	28.6	(39.4)
5-12	6.9	(44.8)	-9.6	(42.5)	-1.3	(31.5)
13-17	38.9	(74.6)	-36.8	(68.1)	1.2	(51.4)
Constant	531.3	(103.8)	578.7	(133.6)	546.0	(81.8)
R-square	0.0534		0.0513		0.0513	
No of obs.	511		286		797	
Females						
Birsth cohort						
1929-38	644.4	(120.7)	417.6	(188.1)	621.9	(99.3)
1939-48	608.7	(117.9)	426.4	(149.5)	544.2	(92.8)
1949-58	370.3	(131.5)	497.9	(162.6)	436.1	(101.8)
1959-68	129.2	(128.5)	191.4	(154.4)	138.9	(98.5)
No of siblings * the age of the youngest child						
- 2	212.1	(53.0)	205.6	(69.6)	213.7	(41.7)
3- 4	104.2	(50.3)	147.5	(62.9)	119.6	(39.1)
5-12	16.5	(48.6)	137.8	(55.8)	65.5	(36.5)
13-17	89.7	(89.1)	130.1	(76.3)	82.9	(56.9)
Constant	824.5	(102.1)	701.1	(129.7)	780.5	(80.5)
R-square	0.0943		0.1308		0.0918	
No of obs.	507		320		829	

Source: Own calculations using HUS-data, Flood et. al. (1997). Sample restricted to individuals born after 1928. The constant represents cohorts born after 1968 to which the older cohorts are compared.

Table 6

Time with and without Children, Sweden 1993 (minutes/day),
by Gender and Age of the Youngest Child (Families with Children under 18)

Men	Child Care	Other Activities with Children	Sleep rest Personal	Other Time Use without Children
Child < 7	79.2	249.6	403.1	631.8
7 - 12	14.6	240.8	447.9	711.1
13 - 17	2.4	173.3	458.1	783.4

Women	Child Care	Other Activities with Children	Sleep rest Personal	Other Time Use without Children
Child < 7	89.7	374.5	437.9	445.0
7 - 12	29.5	292.0	449.7	605.3
13 - 17	3.8	225.2	443.0	702.1

C. Goods Input at Home

Rough estimates of the incremental consumption expenditures because of children can be obtained for Sweden from Table 7. For singles and couples separately, the total of all consumption expenditures for families with children have been compared to those for families without children. The difference has then been divided by the average number of children and converted into constant 1992 SEK. The resulting estimates are most certainly underestimates of the consumption benefits an average child has obtained because children and parents will share the consumption benefits from most durables without lessening the benefits of anyone. On the other hand, if children and consumption are both normal goods, we would expect consumption expenditure and children to be positively correlated, even if the families did not spend ‘on’ the children.

Table 7

Consumption Expenditures per Child, Sweden 1958 - 1992

YEAR	1958	1969	1978	1985	1988	1992
Singles						
with children	10162	22236	55454	102815	122700	184556
without children	6809	14432	37159	69526	89541	120513
Incremental exp./child	2395	5202	13068	23778	23685	42695
Incremental exp./child						
in constant 1992 SEK	20908	31238	36969	35928	31145	42695
Couples						
with children	14213	31025	84346	162568	206080	272848
without children	11920	24025	64970	131157	166567	230045
Incremental exp./child	1274	4079	10764	17451	20796	22528
Incremental exp./child						
in constant 1992 SEK	11122	24494	30451	26368	27346	22528

Note: The average no. of kids were for singles: 1.4, 1.5, 1.4, 1.4, 1.4 and 1.5 respectively, and for couples: 1.8, 1.8, 1.8, 1.8, 1.9 and 1.9. Conversion into constant prices was made using the Consumer Price Index, total annual average.
Sources: Hushållsbudgetundersökningen (Family Expenditure Survey) 1978, Part 3. Statistics Sweden, 1982.Hushållens utgifter 1985, 1988 and 1992, published by Statistics Sweden in 1987, 1990 and 1994 respectively.

Table 8

Consumption Expenditures per Child by Number of Children per Family,

Sweden 1985, 1988 and 1992 (SEK)

	Expenditure			Incremental exp/child			Ditto in constant 1992 SEK		
YEAR	1985	1988	1992	1985	1988	1992	1985	1988	1992
Singles									
no children	71129	94626	123686						
1 child	95378	109932	172950	24249	15306	49264	36640	20127	49264
>1 child	118385	145839	203389	17698	27620	23415	26742	36320	23415
Couples, head <65									
no children	131157	166567	230045						
1 child	152179	190149	260117	21022	23582	30072	31764	31010	30072
2 children	166214	212823	275564	14035	22674	15447	21207	29816	15447
> 2 children	174317	221107	289438	6753	6903	11562	10203	9077	11562

Note: The average number of kids for singles with more than one kid was 2.3 all three years. For couples with more than 2 kids the average was 3.2. Conversion into constant SEK was done using the CPI, total, annual average.
Sources: Hushållens utgifter 1985, 1988 and 1992, Statistics Sweden 1987, 1990 and 1994.

The estimates in Table 7 show a volatility which is hard to explain other than the result of sampling variability, but the numbers indicate that the average incremental expenditures per child and year were about 35 000 in 1992 SEK for singles and about 25 000 for couples. Converted into USD these estimates amounted to about 5000 and 3500 dollars.

D. Public Investments in Children

A few results from a Swedish study of public support to families with children in Europe (Wallberg et. al., 1996) are reproduced in Table 9, supplemented with data for the United States. The tables give the sum of all benefits an average child gets from birth to the age of 19 (finishing high school) as if the benefit levels in 1993 had applied all years. They also detail by the benefit type. In Table 9 the unit of measurement is GDP per capita.

Table 9

Public Support to Children 0-18 Years Old in 1993 by Country

A. Support per Child Measured in GDP per capita

Benefit	C O U N T R Y								
	DK	SF	N	S	F	NL	GB	D	US
Child allowances	0.90	0.94	1.55	1.09	1.16	1.03	0.98	0.61	0.00
Parental leave	0.23	0.67	0.45	0.69	0.18	0.06	0.04	0.40	0.00
Alimonies (advance payments)	0.01	0.06	0.14	0.17	0.04	0.00	0.00	0.01	??
Housing allowances	0.18	0.31	0.11	0.41	0.41	0.11	0.42	1.10	0.00
Public child care	1.33	1.01	0.65	1.62	0.65	0.03	0.05	0.63	0.16[a]
Public schools	3.22	3.75	3.70	3.94	2.70	2.58	2.99	2.75	3.92[b]
Tax allowances	0.00	0.59	0.26	0.00	0.34	0.04	0.09	0.55	0.35[c]
Total	5.88	7.33	6.86	7.92	5.47	3.86	4.58	5.06	4.43

a "The 101st Congress: An Emerging Agenda for Children in Poverty", Sandra L. Hofferth in Child Poverty and Public Policy, Judith A. Chafel, ed. Urban Institute, 1993, p.210. Wallberg, et.al. (1996).
b Expenditures on Children in Primary and Secondary Public Schools, 1993 divided by 1993 GDP.
c Total of children under age 20 as of 1994 (74.955 million) and an assumed tax reduction of $300 per child (state and Federal combined).

There is a clear age profile in the public support of families with children and also clear differences between countries in addition to the general pattern shown in Table 9. This can be seen in Table 10. Most countries have a relatively generous support to families with newborn babies but even by the first year child benefits drop rather precipitously, and in countries with little public child care, like the Netherlands and Great Britain, the level of public support is quite modest for 1 and 2 year olds. Public support rises later in two stages, once at the time primary school starts and then again at a second time when high school starts. Table 10 includes public support for parental leave and other programs. These payments may generally improve the opportunities parents have to provide resources to young children, but do not necessarily measure the actual developmental inputs per se. Parents may use the public funds for their own consumption or may reduce their own child development efforts as the publicly provided care resources are increased. Research on Swedish parents with preschool children shows that for age of child ranges (0-2, 2-7) the hours per week of mother's active child care are 5.31 and 2.26 for those without daycare and 4.22 and 2.48 for those with daycare (Gustafsson and Kjulin, 1994, Table 2). This suggests only a modest offset to parental time for publicly provided care - unless it is believed that there is strong selection on unobservables in the decision to participate and get a space in public daycare.

Data on school expenditures from O.E.C.D. provide a somewhat different picture of public resources to children. At the primary and secondary levels, a point in development where we would expect child development to be the primary goal of the expenditure, we can see the OECD average running about $4,000 - 5,000 per student. There are some fairly large differences between countries, with expenditure for primary and secondary schools on the order of three to one between Spain and the U.S. and Sweden and on the order of two to one between France and Britain on the one hand and the U.S. and Sweden on the other. The effectiveness of school expenditures is a major question. What actually transpires in the classroom? Do greater expenditures partly go to the provision of extended post-school activities as is often the case for U.S. schools or do the greater expenditures go to nonteaching related activities, such as preventative health care, cooked meals, and special teaching activities, as is often the case in Sweden? In the U.S. experience parents may gain a better return on *their* human capital by more market time and career development from added expenditure (Johnson and Stafford, 1996).

Table 10

Public Support to Children 1993, by Age of Child and Country
(SEK/child)

AGE OF	C O U N T R Y							
CHILD	S	DK	SF	N	NL	GB	D	F
<1	101869	54650	84179	107408	18576	21230	60207	59646
1	45048	46068	50706	36719	8138	13898	25889	35311
2	56889	47861	59947	42694	9176	13898	12764	44638
3	57198	47861	44697	46624	11091	18365	35664	47492
4	56915	47861	44697	46624	30142	18365	58564	47492
5	56673	47861	44697	46624	30142	46737	58564	47492
6	56506	47861	44697	46624	36952	46737	40968	45210
7	77280	58770	59633	67070	36952	46737	40968	45210
8	77080	58770	57361	67070	36952	46737	40968	45210
9	76954	58770	57361	67070	36952	46737	40968	45210
10	76775	58770	57361	63139	36952	46737	56766	46710
11	64240	49089	56002	63139	36952	60170	56766	64543
12	63827	49089	56002	61927	49711	60170	55549	64543
13	73448	73941	57197	77243	49711	60170	55549	64543
14	73448	73941	57197	77243	49711	60170	55549	64543
15	73448	73941	57197	77243	49711	60170	55549	66273
16	83756	78707	88005	105363	49781	46051	56696	66308
17	82155	69042	76494	99347	47575	34757	58056	63747
18	57181	69184	66319	86852	43552	14428	51515	48434

Source: Wallberg et.al. (1996)

Table 11

Public Support to Students 1991, by Age of Child and Country
(USD/child)

School	C	O	U	N	T	R	Y
Level	S	DK	US	E	GB	F	OECD Total
Preschool [a]	2501	4376	4014	1777	2233	2163	3125
Primary	5470	4397	5177	1861	2794	2591	3969
Secondary	6635	5378	6472	2730	4255	4640	4791
Primary and Secondary	6057	4962	5780	2405	3559	3785	4664
Higher	8561	7685	11802	3242	9621	4760	8477
All Levels Combined	6157	5489	6527	2490	4268	3847	4681

[a] The OECD data are not comparable for preschool expenditures, for instance, some countries have chosen not to report child care expenditures. Only expenditures for public schools are reported.
Source: Expenditure per student and by level, O.E.C.D.

E. Total Magnitude of Child Investments

To get an idea of order of magnitudes we now put together estimates from the tables above for Sweden. Table 2 shows that a couple uses about 1.5 hours per day in direct child care which corresponds to 548 hours in a year for children under age 7. If, on average, the couple has 2 children and each gets about half of this time, the annual care time totals 274 hours. The incremental estimates in Table 4C for the U.S. and the companion estimates for Sweden provide somewhat lower estimates, so we assume that 250 hours is a reasonable per child estimate of primary child care time for kids less than 7 years old and a little lower for older kids, say 180 hours. The estimated incremental for household work is about 200 hours per child less than 7 and couple, and about 70 hours for older children (Table 5B).

The final time input component is other or 'joint time' with children which, from Table 6, can be estimated to be on the order of 3800 hours per year for children less than 7 and 2860 hours for older children. From this amount we should subtract any incremental household work with the kids present, say 100 and 10 hours respectively. (This could also include some public good elements, with joint time on multiple children. We disregard this.) In total, a couple would thus use about 4150 hours per year on an average child less than 7 years old and about 3100 hours on an average 7-17 years old child. To compare with the input of goods and services we need to convert these hours into monetary units. In doing this we have quite arbitrarily assumed that household work only has 50 per cent of the investment value of direct child care and other time with children is equivalent to only 20 per cent. Thus the hours input of household work and other time with children has been multiplied with 0.5 and 0.2 respectively. Then we have used an average hourly wage rate (before tax) of 80 SEK. The result is displayed in the Table 12.

These estimates indicate that Swedes on average invest annually between 150000 and 200000 SEK on a young child, which approximately corresponds to an investment in USD between 22000 and 29000. Given our weighting of the time inputs, total time input makes up 49 per cent of the total, private goods and services 17 and publicly provided goods and services 34 per cent for young children. For older children the corresponding shares are 39, 18 and 43. The share for expenditures on goods and services should probably be somewhat lower for young kids and somewhat higher for older kids, because older kids usually cost more than younger kids. Now we have used the same estimate 30000 SEK for everybody. There are also other shortcomings: health investments are not included other than publicly provided helath care in schools and the small

share of the costs for health care and medicin payed by parents[5], the value of childrens own time is not included, and we have neglected that a child who lives with a single parent probably gets less time input but more goods input (cf. Tables 7 and 8)

[5]In Sweden a larger share is payed for through the social security system.

Table 12

Total Value of Child Investments, Time and Goods
Average per Child, Two Parents, Sweden, 1993

	Children less than 7 years old		Children 7-17 years old	
	Hours/year	SEK/year	Hours/year	SEK/year
Time input				
-direct child care	250	20000	180	14400
-household work	200	8000	70	5600
-time with children	3700	59200	2850	45600
-all time input	4150	87200	3100	65600
Family Goods Input		30000		30000
Publicly Provided Goods and Services Input		62000		73000
Total		179200		168600

IV. Discussion and Conclusion

In this paper we have attempted to piece together time use and other data to provide an overview of the magnitude of investments in early human capital in Sweden, the United States and selected countries. Our data have been primarily based on parental time. An alternative is to use data on children's own activities, classifying the activities in terms of learning and development potential. For Sweden the number of children under age 18 in 1992 (1,914,616) times an average investment amount of about 170000 SEK gives the total of 325,485 million SEK, an amount equal to 22.7 percent of GDP. Gross fixed capital formation in 1992 was 17 percent of GDP in this year, so investment in children by adults (i.e. ignoring the own value of time for older children and other omissions mentiond above) was of greater magnitude than traditional economic investment! The mere size of these numbers raises a series of interesting question related to the effects of investments in children on economic growth, to the trade off between public and private investments and to issues of distribution and equity.

To judge the developmental potential of the activities we can rely on estimates of the effectiveness of early time use from panel data (Stafford, 1987). This is not a simple task either. Parents appear to be equity seekers with regard to their children, and children with developmental limitations appear to 'get more' (Barnett, 1993). This seems at odds with the idea that parents could provide for children with limited human capital potential by simply transferring more financial wealth to them. In dissertation work by Dan Natali in the mid 1970's (Natali, 1979), people in the Economic Behavior Program became familiar with the 'compensation hypothesis': middle class parents receiving feedback of lagging performance of their first graders were likely to spend more time to 'compensate' for the deficit. To what extent are skill-equalizing investments important as ex ante income inequality reduction mechanisms? Will these grow in importance if public support for ex post income inequality reduction dwindles in the United States and Sweden?

Despite the difficulties in implementing an investment perspective on early human capital formation, it is now evident that there is a rising importance of human capital in the total capital stock of an economy. In the case of Sweden we can see a very modest decline in child care time by families over the period 1984 to 1993, but this was arguably offset by the extensive public day care, and cross-sectional evidence indicates that parents with children in the system reduce their child care time at home only modestly. This is an area that deserves further study.

Recent use of repeated cross-section surveys with more detailed disaggregation than in our Table 1 for Norway and Finland indicate a modest upward drift in child care minutes per day (Harvey, 1996). For Norway, in 1971-72 total family care was .30 hours per day, by 1980-81 it had risen to .37 hours, and by 1990-91 it had risen to .45 hours. For Finland the estimates were given under a somewhat different definition, but rose from .17 hours in 1980-81 to .20 hours in 1990-91. In both these countries the number of young children in the family was stable or falling, so there was a modest rise in care time per child. These patterns are consistent with the human capital and 'new home economics' models discussed in Section IIB. Using such a framework combined with household time diary data it is possible to develop the types of accounting systems advocated by Tom Juster over twenty years ago. The promise is that our knowledge of capital formation and long run growth can be thereby improved greatly!

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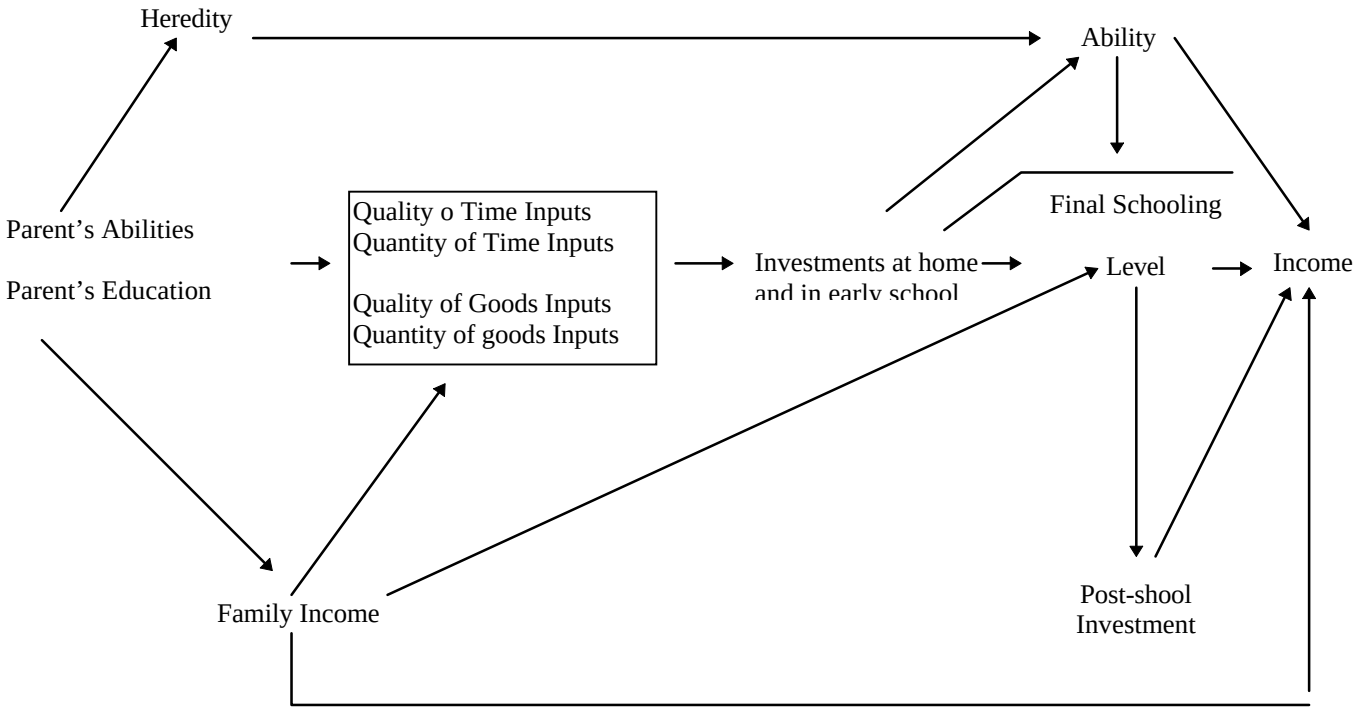
Figure 1. Home Investments in Children [a]



[a] Adapted from Leibowitz (1974)

Table 2a
Life Cycle Human Capital Paths
The Effect of Early Investment

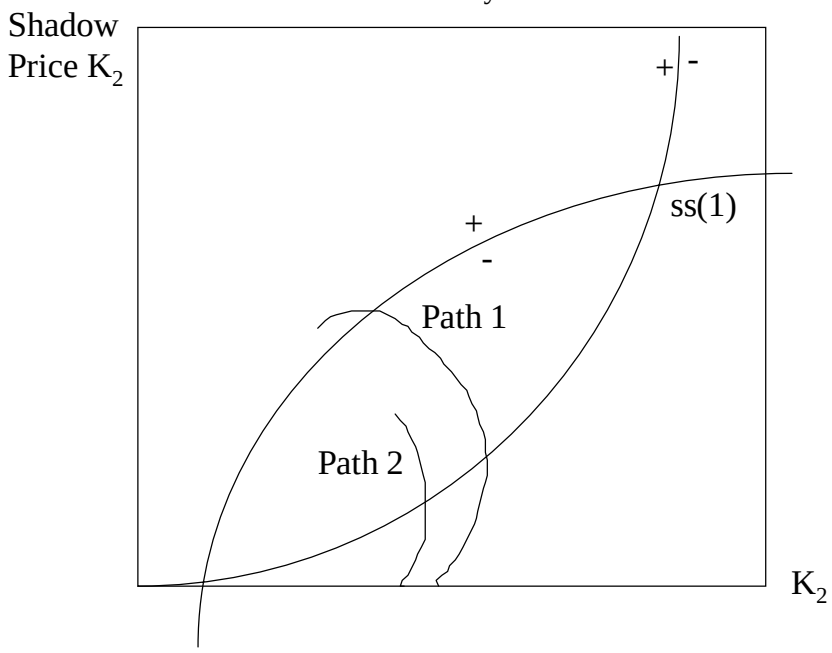


Figure 2b
Lifetime Labor Supply
Paths Shaped by Early Human Enabling Capital